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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Douglas A. Hawks

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THOMAS, KAYDEN, HORSTEMEYER & RISLEY, LLP  
100 GALLERIA PARKWAY, NW  
STE 1750  
ATLANTA, GA 30339-5948

EXAMINER

TRINH, MICHAEL MANH

ART UNIT

PAPER NUMBER

2822

DATE MAILED: 01/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

24

<b>Office Action Summary</b>	<b>Application No.</b> 10/649,577	<b>Applicant(s)</b> HAWKS ET AL.	
	<b>Examiner</b> Michael Trinh	<b>Art Unit</b> 2822	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 24 October 2005.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-8, 16, 17 and 20-27 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8, 16, 17 and 20-27 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

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## DETAILED ACTION

\*\*\* This office action is in response to Applicant's Amendment filed on October 24, 2005.

Claims 9-15,18-19 were canceled. Claims 1-8,16,17,20-27 are pending.

\*\*\* The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

### *Claim Rejections - 35 USC § 102*

1. Claims 1,3-6,16,20-24,26 are rejected under 35 U.S.C. 102(e) as being anticipated by Yamaguchi (6,166,430).

Yamaguchi teaches (at Figs 1-6, 7a to 9f; col 6, line 40 through col 16) a method for forming a package for an electrical device, the method comprising the steps of attaching a removable material 12 to a surface of a conductive material 16,15 before one or more isolated conductive features 14,9 have been formed within the conductive material (Fig 4, lines 45-54; and Fig 3; col 8, lines 34-44); forming isolated conductive features 14,9 within said conductive material 16,15 (Figs 3-4; col 8, lines 45-67); attaching encapsulant 19 to said isolated conductive features 14,9 and said removable material 12 (Figs 5c,7d,9d; col 9, lines 32-67; col 11, lines 1-40), wherein the attaching step is performed before a singulation process is performed to separate the package (Figs 7d,9d; col 9, lines 32-67; col 11, lines 1-40); and removing said removable material 12 from said conductive features and said encapsulant 19 (Figs 7d-7e,9d-9e; col 11, lines 41-52), wherein removing the material 12 is performed after a singulation cut-off process to separate the package (col 11, lines 62-64) or prior to a singulation cut-off process to separate the package (Fig 7e-7f; col 11, lines 41-61). Re claim 3, wherein a die attach pad 14 is formed within said conductive material 16,15 (Figs 1,3,4; col 6, lines 40 through col 7; col 8, lines 45-67). Re claim 4, wherein the device 17 is coupled to said die attach pad 14 (Figs 5a-5b; 7b-7f; col 9, lines 32-53; col 10, lines 59-67). Re claim 5, wherein an input/output portion of the device 17 is electrically coupled to said isolated conductive feature 9 (Figs 7c-7f,6; col 10, lines 20-34; col 10, line 63 through col 11). Re claim 6, wherein the method further comprises the step of singulating individual packaged devices (Figs 7e-7f; col 11, lines 53-67; col 7, lines 17-22). Re claim 16, wherein the removable material of plastic film 12 of polyimide is used and acted as a molding stencil during molding of encapsulant 19 (Figs 7d, col 11, line 1 through col 12), wherein removing the material 12 is performed either prior to a singulation process to separate

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the package (Fig 7e-7f; col 11, lines 41-61) or after a singulation process to separate the package (col 11, lines 62-64). Re claim 20, wherein the conductive material 15,16 comprises a metal frame sheet (Fig 2-4). Re claim 21, wherein the conductive material 16,15 comprises a metal leadframe (Figs 4,3). Re claim 22, wherein die attach pad 14 is not offset from the isolated conductive features 9 (Figs 5c). Re claim 23, wherein a single row of connectors 9 is formed around perimeter of the leadframe (Figs 5b,2). Re claim 24, wherein the metal frame comprise a metal sheet 16,15 (Figs 4,2). Re claim 26, wherein the removable material 12 covers substantially the entire bottom surface of the metal lead frame 14,9 (Figs 7a,).

***Claim Rejections - 35 USC § 103***

2. Claims 1-6,16,20-24,26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Glenn (6,247,229) taken with Yamaguchi (6,166,430).

Glenn teaches (at Figs 2-9; col 3, line 18 to col 4; Fig 1, cols 5-6); a method for forming a package for an electrical device, the method comprising the steps of attaching a removable material 10 to a surface of a conductive material 13 before one or more isolated conductive features have been formed within the conductive material (Fig 2, col 3, lines 38-53, 18-67); forming isolated conductive features 24,20 within said conductive material 13 (Figs 3-4; col 4, lines 1-29); attaching encapsulant 32 to said isolated conductive features 24,20 and said removable material 10 (Fig 6, col 4, lines 48-67), wherein the attaching step is performing before a singulation process is performed to separate the package (Figs 6-9); and removing said removable material 10 from said conductive features 24,20 and said encapsulant 32 (Fig 7; col 5, lines 49-67). Re claim 2, wherein said forming step includes patterning a surface of said conductive material 13 with a material resistant of photoresist to an etchant and etching said conductive material 13 with said etchant (col 3, lines 54-67). Re claim 3, wherein a die attach pad 20 is formed within said conductive material 13 (Figs 3-4; col 4, lines 1-24). Re claim 4, wherein the device 28 is coupled to said die attach pad 20 (Fig 5; col 4, lines 30-41). Re claim 5, wherein an input/output portion of the device 28 is electrically coupled to said isolated conductive feature 24 (Figs 5,10, col 4, lines 35-41). Re claim 6, wherein the method further comprises the step of singulating individual packaged devices (Figs 8-9; col 6, lines 4-60). Claim 16, wherein the removable material 10 is used and acted as a molding stencil during

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molding of encapsulant 30 (Figs 6-7; col 4, lines 48-67), and wherein removing the material 10 is performed prior to a singulation process to separate the package (Figs 6-8; col 5, line 61 through col 6, lines 24). Re claim 20, wherein the conductive material 13 comprises a metal frame sheet (Figs 2-4; col 3, lines 39-65). Re claim 21, wherein the conductive material 13 comprises a metal frame sheet 13 for leadframe having leads 24 (Figs 2-4, col 3, lines 39-45). Re claim 22, insofar as understood, die attach pad 20 is not offset from the isolated conductive features 24 (Figs 3-4; col 1, lines 1-29). Re claim 23, wherein a single row of connectors 24 is formed around perimeter of the leadframe (Figs 2-4; col 3, line 39 through col 4, line 45). Re claim 24, wherein the metal frame comprise a metal sheet (Figs 2-4; col 3, lines 39-65). Re claim 26, wherein the removable material 10 covers substantially the entire bottom surface of the metal frame sheet 13 (Figs 2-3).

Re claim 1, similar to a first embodiment of the present invention, Glenn already teaches removing the removable material 10 prior to a singulation process to separate the package (Figs 6-8; col 5, line 61 through col 6, lines 24), but lacks removing the material after a singulation process to separate the package (a second alternative embodiment as recited in claim 1).

However, Yamaguchi teaches (at col 11, lines 41-64; Figs 7e-7f) removing the material 12 either prior to a singulation process to separate the package (col 11, lines 41-61) or after a singulation process to separate the package (col 11, lines 62-64).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to remove the removable material of Glenn either after a singulation process to separate the package or prior to a singulation process as alternatively taught by Yamaguchi. This is because removing the removable material either after or prior to the singulation process are alternative and art recognized equivalent processes for substitution in fabrication of the electronic device, and because of the desirability to expose a portion of the metal lead frame and conductive features for subsequent electrical connection, wherein by removing the removable material after singulation process, the removable material would still cover and thereby consequently protect the metal lead frame from being contaminated during singulation process.

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3. Claims 7-8 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Glenn (6,247,229) and Yamaguchi (6,166,430), as applied to claims 1-6,16,20-24,26 above, taken with Wyland (6,111,199) and Weng et al (5,972,234).

The references including Glenn and Yamaguchi teach (at Figs 2-7; col 3, line 18 to col 4; Fig 1, cols 5-6) a method for forming a package for an electrical device as applied to claims 1-6 above.

Re claims 7-8,17, Glenn already teaches (at col 3, lines 20-37) the removable material comprising a plastic, polyimide, wherein a soluble plastic adhesive that is removed by dissolving in a solvent, such as acetone (col 5, lines 48-54). Claim 7 recites the removable material comprising a water soluble adhesive. Claim 8 recites removing the removable material with deionized water. Claim 17 recites the removable material comprises polyimide and water soluble adhesive.

However, *Wyland et al* teach (at col 8, lines 1-10; col 7, lines 54-67) forming an adhesive resin film on a substrate, wherein polyimide, alkali-soluble resin, or water-soluble resin are alternatively used for forming the adhesive resin film. *Weng* teaches (col 5, lines 34-37,27-51; and col 4, line 25 through col 5, line 51) the removable material for electronic device comprises a polymeric-base material and a water soluble adhesive, wherein removing the removable adhesive material is performed with deionized water (as a pure water).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the removable material of polyimide of Glenn by providing a water-soluble resin as a water soluble adhesive to the back of the polyimide, as taught by Wyland and Weng. This is because the substitute art recognized equivalent removable materials, as alternative materials, is within the level of one of ordinary skill in the art, wherein water-soluble resin material, plastic, or polyimide having adhesive backing are highly adhesive to the terminals of the lead frames, wherein, by using water soluble resin/adhesive, removing the removable materials can be easily and conveniently performed with water, as further taught by Weng, and less expensive, wherein with the use of deionized water, as a high purity water, ion contamination of the device is prevented and thereby improving reliability and quality.

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4. Claims 25 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Glenn (6,247,229) and Yamaguchi (6,166,430), as applied to claims 1-6,16,20-24,26 above, taken with Fjelstad (6,001,671).

The references including Glenn and Yamaguchi teach (at Figs 2-7; col 3, line 18 to col 4; Fig 1, cols 5-6) a method for forming a package for an electrical device as applied to claims 1-6,16,20-24,26 above. Glenn also teaches forming a single row of connectors 24 around perimeter of the metal frame sheet 13 (Figs 2-4; col 3, line 39 through col 4, line 45).

Re claim 25, Glenn already teaches forming a single row of connectors 24, but lacks having a multiple row. Re claim 27, Glenn already uses an adhesive material to couple the device to the die pad (Fig 5; col 4, lines 30-41), but lacks using a conductive epoxy.

However, re claim 25, Fjelstad teaches (at col 4, lines 5-10; Fig 1D-3) to arrange the pad connectors 110 around perimeter of the central region either in single rows or multiple rows. Re claim 27, Fjelstad also teaches (at col 4, lines 32-45) to use a thermally conductive epoxy to couple the device to the die pad.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the pad connectors around perimeter of the metal frame sheet of Glenn either in a single row or multiple rows as taught by Fjelstad. This is because of the desirability to arrange a plurality of pad connectors within a small area around perimeter of electronic device. Furthermore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form couple the electronic device of Glenn to the die pad b using the thermally conductive epoxy as taught by Fjelstad. This is at least because of the desirability to provide a direct thermal pad to draw heat away from the electronic device.

### ***Response to Arguments***

**\*\*** Applicant's amendment and remarks filed October 24, 2005 have been fully considered but they are moot in view of the new ground(s) of rejection.

Applicant mainly remarked about Yamaguchi (6,166,430) at remark pages 7-8 that "...a portion of leads 8 which are not encapsulated during the manufacturing process are removed and this is done after the singulation process...".

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In response, this is noted and found unconvincing. As clearly shown in Figures 7d and 9d of Yamauchi, encapsulant 19 is attached to the chip 17, the isolated conductive features 14,9, and removable material 12 (Figs 7d,9d; col 9, lines 32-67; col 11, lines 1-40), wherein the attaching step is performed before a singulation cut-off process to separate the package (Figs 7d,9d; col 9, lines 32-67; col 11, lines 1-40), wherein appropriate portions of the leads 8 are also encapsulated. Moreover, as shown from Figures 7d to Figure 7e (col 11, lines 41-52 and Figures 9d-9e), the removable material 12 is removed from the conductive features and the encapsulant 19, wherein removing the material 12 is performed after a singulation cut-off process to separate the package (col 11, lines 62-64) or prior to a singulation cut-off process to separate the package (Fig 7e-7f; col 11, lines 41-61).

Claimed subject matter, not the specification, is the measure of invention. Limitations in the specification cannot be read into the claims for the purpose of avoiding the prior art. In *Re Self*, 213 USPQ 1,5 (CCPA 1982); In *Re Priest*, 199 USPQ 11,15 (CCPA 1978).

Also, it must be remembered that the references are relied upon in combination. It is the combination of all of the cited and relied upon references which make up the state of art with regard to the claimed invention. In *re Young*, 403 F.2d 754,159 USPQ 725 (CCPA 1968); In *re Keller* 642 F.2d 413, 208 USPQ 871 (CCPA 1981). Moreover, the rejection is not overcome by pointing out that one reference does not contain a particular limitation when reliance for that teaching is on another reference. In *Re Lyons* 150 USPQ 741 (CCPA 1966).

\*\*\*\*\*

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.



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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael M. Trinh whose telephone number is (571) 272-1847. The examiner can normally be reached on M-F: 9:00 Am to 5:30 Pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Zandra Smith can be reached on (571) 272-2429. The central fax phone number is (703) 872-9306.

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Michael Trinh  
Primary Examiner